

We claim:

1. A pump system for parking brakes for a rail vehicle, comprising:
  - a bi-directional pump having pump apply and pump release ports and an actuator;
  - a reservoir in fluid communication with a manifold;
  - the manifold having manifold apply and manifold release ports connecting the pump apply and pump release ports, respectively, with the reservoir;
  - a single pressure relief valve configured to allow fluid flow into the reservoir when a system pressure at the pressure relief valve reaches a predetermined level, thereby limiting the actuator's input force;
  - a shuttle valve that selectively connects the pressure relief valve to either the pump apply port or the pump release port, whichever has the higher pressure;
  - a brake cylinder having a brake apply port and a brake release port in fluid communication with the pump apply port and pump release port, respectively, and a brake piston; and,
  - wherein, the pump and the reservoir are mounted directly on the manifold forming an integral unit.
2. The pump system of Claim 1, wherein the actuator is a wheel rotatably coupled to the pump.
3. The pump system of Claim 2, wherein the direction of rotation of the wheel selectively controls the direction of fluid flow from the pump.
4. The pump system of Claim 1, wherein the manifold further includes an apply check valve and a release check valve that selectively connect the pump apply and pump release ports, respectively, to the reservoir.
5. The pump system of Claim 4, wherein the apply check valve prevents fluid flow from the pump through the apply check valve to the reservoir when the pump expels fluid in an apply direction and allows fluid flow between the reservoir and the pump when the pump expels fluid in a release direction.

6. The pump system of Claim 4, wherein the release check valve prevents fluid flow from the pump through the release check valve to the reservoir when the pump expels fluid in a release direction and allows fluid flow between the reservoir and the pump when the pump expels fluid in an apply direction.

7. The pump system of Claim 1, wherein the manifold includes a pressure indicator in fluid communication with the pressure relief valve allowing viewing of detected fluid system pressure.

8. The pump system of Claim 1, wherein the pre-determined level of system pressure is at least equal to or less than 65 pounds.

9. The pump system of Claim 1, wherein the unit is an integral unit and the pump, reservoir and manifold are connected by use of standard connections selected from the group consisting of: bolts, screws, washers, nuts, mounting plates and threaded couplings.

10. The pump system of Claim 1, wherein the unit is a monolithic unit.

11. The pump system for parking brakes for a rail vehicle comprising:  
a bi-directional pump having pump apply and pump release ports and an actuator mounted to a manifold;  
a reservoir mounted to the manifold;  
the manifold connecting the pump apply and pump release ports, respectively, with the reservoir; and  
a brake cylinder having a brake apply port and a brake release port in fluid communication with the pump apply port and pump release port, respectively, and a brake piston.

12. The pump system of Claim 11, wherein the system further includes single pressure relief valve configured to allow fluid flow into the reservoir when a system pressure at the pressure relief valve reaches a pre-determined level, thereby limiting actuator input force.

13. The pump system of Claim 11, wherein the system further includes a shuttle valve that selectively connects the pressure relief valve to either the pump apply port or the pump release port, whichever has the higher pressure.

14. The pump system of Claim 11, wherein the actuator is a wheel rotatably coupled to the pump.

15. The pump system of Claim 14, wherein the direction of rotation of the wheel selectively controls the direction of fluid flow from the pump.

16. The pump system of Claim 11, wherein the manifold further includes an apply check valve and a release check valve that selectively connect the pump apply and pump release ports, respectively, to the reservoir.

17. The pump system of Claim 16, wherein the apply check valve prevents fluid flow from the pump through the apply check valve to the reservoir when the pump expels fluid in an apply direction and allows fluid flow between the reservoir and the pump when the pump expels fluid in a release direction.

18. The pump system of Claim 17, wherein the release check valve prevents fluid flow from the pump through the release check valve to the reservoir when the pump expels fluid in a release direction and allows fluid flow between the reservoir and the pump when the pump expels fluid in an apply direction.

19. The pump system of Claim 18, wherein the manifold includes a pressure indicator in fluid communication with the pressure relief valve allowing viewing of detected fluid system pressure.

20. The pump system of Claim 11, wherein the pre-determined level of system pressure is equal to or less than 65 pounds.

21. The pump system of Claim 1, wherein the bi-directional pump is an electric pump.

22. A pump system for parking brakes for a rail vehicle, comprising:  
a reservoir as a fluid source;  
a manual pump;  
a motor pump;  
a manifold having a plurality of valves and fluid paths internally to allow fluid flow between the pumps and the reservoir; and  
wherein the reservoir and pumps are mounted directly to the manifold forming an integral unit.

23. A pump system for parking brakes for a rail vehicle, comprising:  
an actuator;  
a reservoir as a fluid source;  
a manual pump;  
a motor pump;  
a manifold in fluid communication with the reservoir and the actuator;  
a plurality of valves and fluid paths internal to the manifold to allow fluid flow among the actuator, the pumps and the reservoir; and  
wherein the reservoir and pumps are mounted directly to the manifold forming an integral unit.

24. A pump system for parking brakes for a rail vehicle, comprising:  
an actuator;  
a reservoir as a fluid source;  
a manual pump;  
a motor pump;  
a manifold in fluid communication with the reservoir and the actuator;  
a plurality of valves and fluid paths internal to the manifold to allow fluid flow among the actuator, the pumps and the reservoir; and  
wherein the reservoir and pumps are mounted directly to the manifold forming an integral unit.

25. A pump system for parking brakes for a rail vehicle, comprising:  
at least one actuator;  
a reservoir as a fluid source;  
at least one bi-directional pump;  
a manifold in fluid communication with the reservoir and the at least one actuator;  
a plurality of valves and fluid paths internal to the manifold to allow fluid flow among the actuator, the at least one pump and the reservoir; and  
wherein the reservoir and the at least one pump are mounted directly to the manifold forming an integral unit.

26. The pump system of claim 25, wherein the at least one bi-directional pump includes a rotary pump.

27. The pump system of claim 25, wherein the at least one bi-directional pump includes a linear pump.

28. The pump system of claim 27, wherein the linear pump includes a dual displacement pump.

29. The pump system of claim 28, wherein apply and release operations of the pump system occur with a single stroke of a piston in the linear pump.